Claims

What is claimed is:

1. A bicycle crank set, comprising:

a. a first tubular member;

b. a second tubular member;

c. a spider connected to the second tubular member; and

d. a coupling securing the first tubular member to the second tubular member.

2. The crank set of claim 1, wherein the first and the second tubular members include:

a. a crank arm; and

b. a portion of a crank axle; the crank arm and the portion of the crank axle forming a continuous, monolithic thin-wall tubular shape.

3. The crank set of claim 2, wherein the first and the second tubular members further include a pedal axle; the crank arm, the portion of the crank axle and the pedal axle forming a continuous, monolithic thin-wall tubular shape.

4. The crank set of claim 2, wherein the spider is incorporated into the continuous, monolithic thin-wall tubular shape of the second tubular member.

5. The crank set of claim 2, wherein the portion of the crank axle is precisely one-half of a total crank axle length of the crank set.

6. The crank set of claim 2, wherein the crank arm is tapered.

7. The crank set of claim 6, wherein the tapered crank arm further comprises an elliptical cross-section and is designed to distribute stresses uniformly and equally over a length of the crank arm.

8. The crank set of claim 2, wherein the first and the second tubular members are injection molded, comprising an aramid fiber composite material.

9. The crank set of claim 2, wherein the first and the second tubular members are injection molded, comprising a carbon and glass fiber composite material.

10. The crank set of claim 2, wherein the first and the second tubular members are steel-stamped parts of clamshell design electron beam or laser welded together to form the continuous, monolithic thin-wall tubular shape.

11. The crank set of claim 1, wherein the coupling includes:

a. an outer sleeve;

b. an inner sleeve;

c. two exteriorly tapered, internally threaded bushings; and

d. a threaded stud; wherein turning the stud threadably positions the bushings to expand the inner sleeve, thereby securing a connection between the first and the second tubular members between the inner and the outer sleeves.

12. The crank set of claim 11, wherein the connection between the first and the second tubular member includes interlocking an end of the crank axle portion of the first and the second tubular members, the end of the crank axle portions having a convoluted split configuration.

13. The crank set of claim 1, wherein the coupling includes:

a. a mortise member; and

b. a tenon member, wherein the tenon member fits into the mortise member to secure the first tubular member to the second tubular member.

14. The crank set of claim 13, wherein the coupling further includes an attachment bolt, the attachment bolt passing through a clearance hole in the tenon member and threadably attaching to an attachment hole in the mortise member, whereby threading the attachment bolt into the attachment hole in the mortise member securely interlocks the tenon member into the mortise member.

15. The crank set of claim 13, wherein the coupling further includes an attachment bolt, the attachment bolt passing through a clearance hole in the mortise member and threadably attaching to an attachment hole in the tenon member, whereby threading the attachment bolt into the attachment hole in the tenon member securely interlocks the mortise member into the tenon member.

16. The crank set of claim 13, wherein the mortise member and the tenon member are non-tapered.

17. The crank set of claim 13, wherein the mortise member and the tenon member align to place the crank arms in 180° relation to one another.

18. The crank set of claim 14, wherein the clearance hole is threaded and has a diameter greater than the diameter of the attachment hole, the coupling being separated by threading a separation bolt into the clearance hole and rotating the separation bolt until an end of the separation bolt forces the tenon member apart and away from the mortise member.

19. The crank set of claim 15, wherein the clearance hole is threaded and has a diameter greater than the diameter of the attachment hole, the coupling being separated by threading a separation bolt into the clearance hole and rotating the separation bolt until an end of the separation bolt forces the mortise member apart and away from the tenon member.

20. The crank set of claim 13, wherein the coupling is made of a boron composites.

21. The crank set of claim 13, wherein the coupling is made of steel.

22. The crank set of claim 13, further comprising two bearing sets, wherein the coupling is located precisely midway between the two bearing sets.

23. The crank set of claim 1, further comprising two bearing sets, wherein the coupling is located precisely midway between the two bearing sets.

24. The crank set of claim 23, wherein the bearing sets include:

a. an outer cup;

b. an inner cup;

c. seals; and

d. ceramic balls, the balls being housed within the outer cup, the inner cup and the seals and are separated by a retaining ring.

25. The crank set of claim 24, wherein the ceramic balls are made of silicon nitride.

26. The crank set of claim 24, wherein the outer cup and the inner cup are made of 52100 steel and are hardened and sputer coated with titanium aluminum nitride to provide an overall hardness exceeding Rockwell 90.

27. The crank set of claim 24, wherein the seals are spring loaded Teflon garter.

28. The crank set of claim 2, wherein the crank arm further includes an internally threaded titanium insert.

29. The crank set of claim 28, wherein the crank arm includes a compression molded carbon fiber and glass composite portion, in the vicinity of the insert, to house the insert.

30. The crank set of claim 18, wherein the diameter of the clearance hole is 10 mm, the diameter of the attachment hole is 8mm, the diameter of the attachment bolt is 8mm and the diameter of the separation bolt is 10mm.

31. The crank set of claim 19, wherein the diameter of the clearance hole is 10 mm, the diameter of the attachment hole is 8mm, the diameter of the attachment bolt is 8mm and the diameter of the separation bolt is 10mm.

32. The crank set of claim 24, wherein the retaining ring is mylar.

33. A bearing set for a bicycle, comprising:

a. an outer cup;

b. an inner cup;

c. seals; and

d. ceramic balls, the balls being housed within the outer cup, the inner cup and the seals and are separated by a retaining ring.

34. The crank set of claim 33, wherein the ceramic balls are made of silicon nitride.

35. The crank set of claim 33, wherein the outer cup and the inner cup are made of 52100 steel and are hardened and sputer coated with titanium aluminum nitride to provide an overall hardness exceeding Rockwell 90.

36. The crank set of claim 33, wherein the seals are spring loaded Teflon garter.

37. The crank set of claim 33, wherein the retaining ring is mylar.

38. An interference fit coupling for attaching two crank axle portions of a crank set, comprising:

a. a mortise member; and

b. a tenon member, wherein the tenon member fits into the mortise member to secure the two crank axle portions of the crank set.

39. The coupling of claim 38, further comprising an attachment bolt, the attachment bolt passing through a clearance hole in the tenon member and threadably attaching to an attachment hole in the mortise member, whereby threading the attachment bolt into the attachment hole in the mortise member securely interlocks the tenon member into the mortise member. .

40. The coupling of claim 38, further comprising an attachment bolt, the attachment bolt passing through a clearance hole in the mortise member and threadably attaching to an attachment hole in the tenon member, whereby threading the attachment bolt into the attachment hole in the tenon member securely interlocks the mortise member into the tenon member. .

41. The coupling of claim 39, wherein the clearance hole is threaded and has a diameter greater than the diameter of the attachment hole, the coupling being separated by threading a separation bolt into the clearance hole and rotating the separation bolt until an end of the separation bolt forces the tenon member apart and away from the mortise member.

42. The coupling of claim 40, wherein the clearance hole is threaded and has a diameter greater than the diameter of the attachment hole, the coupling being separated by threading a separation bolt into the clearance hole and rotating the

separation bolt until an end of the separation bolt forces the mortise member apart and away from the tenon member.

43. The coupling of claim 38, wherein the mortise and the tenon members each have cylindrically tubular walls, the cylindrically tubular walls are each sleeved over a composite crank axle portion of a tubular member.

44. The coupling of claim 43, wherein the cylindrically tubular walls are secured to the composite crank axle portion of the tubular member by high strength epoxy adhesive.

45. A method for assembling a crank set within a bracket shell of a bicycle, comprising:

a. threading outer cups of a bearing set into each of two ends of the bracket shell;

b. inserting inner cups of the bearing sets onto each of a crank axle portion of two crank set members;

c. inserting the crank axle portion of one of the two crank set members into each end of the bracket shell within the outer cups and retaining rings of each bearing set;

d. interlocking the crank axle portions of the two crank set members;

e. preloading the two bearing sets; and

f. securing the outer cups to the bracket shell.

46. The method of claim 45, wherein the two crank axle portions of the crank set members are interlocked by fitting a tenon member on an end of one crank axle portion into a mortise member on an end of another crank axle portion.

47. The method of claim 46, wherein the tenon member is fitted into the mortise member by an attachment bolt, the attachment bolt passing through a clearance hole in an end of one crank axle portion and threadably attaching to an attachment hole in an end of another crank axle portion.

48. A tapered four coupling for attaching two crank axle portions of a crank set, comprising:

a. a male member having four tapered sides, each of equal surface area; and

b. a female member having four tapered sides, each of equal surface area, wherein the four tapered sides of the male member interlock with the four tapered sides of the female member to secure the two crank axle portions of the crank set.

49. The coupling of claim 48, further comprising an attachment bolt, the attachment bolt passing through a clearance hole in the male member and threadably attaching to an attachment hole in the female member, whereby threading the attachment bolt into the attachment hole in the female member securely interlocks the male member into the female member. .

50. The coupling of claim 48, further comprising an attachment bolt, the attachment bolt passing through a clearance hole in the female member and threadably attaching to an attachment hole in the male member, whereby threading the attachment bolt into the attachment hole in the male member securely interlocks the female member into the male member. .

51. The coupling of claim 49, wherein the clearance hole is threaded and has a diameter greater than the diameter of the attachment hole, the coupling being

separated by threading a separation bolt into the clearance hole and rotating the separation bolt until an end of the separation bolt forces the male member apart and away from the female member.

52. The coupling of claim 48, wherein the male and the female members each have cylindrically tubular walls, the cylindrically tubular walls are each sleeved over a composite crank axle portion of a tubular member.

53. The coupling of claim 52, wherein the cylindrically tubular walls are secured to the composite crank axle portion of the tubular member by high strength epoxy adhesive.

54. The coupling of claim 48, wherein the two crank axle portions are equal in length.